Fingerprinting Epoxy Resins with Agilent OligoPore and Gel Permeation Chromatography

Application Note

Materials Testing and Research

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Introduction

Epoxy resins are commercially important materials that consist of bridged diepoxide oligomers of increasing molecular weight. The distribution of oligomers in individual resins dictates the physical nature of the finished materials such as curing time and mechanical strength.

The analysis of the oligomer distribution by gel permeation chromatography (GPC) allows different grades of resin to be fingerprinted and is of vital importance for quality and process control.

Agilent's OligoPore columns have been specifically designed for the analysis and fingerprinting of oligomeric samples, as shown in this example with two commercial epoxy resins, Epikote 828 and Epikote 1001.

Epoxy Resin Analysis

The Epikote samples were made up at 0.2% (w/v) in tetrahydrofuran and injected without further treatment. Figure 1 shows a close up of the Epikote 828 chromatogram, which was dominated by a single oligomer peak with only small quantities of other oligomers, while Figure 2 is a comparison of the chromatograms of Epikote 828 and 1001. Epikote 1001 contains many oligomers with increasing molecular weight up to the exclusion limit of the column at about 4,000 g/mol. The presence of oligomers with the same retention times in both samples indicates that some of the oligomers in the two samples are identical.

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Conditions

Samples	Epikote 828 and 1001, 0.2% (w/v)
Columns	2 × Agilent OligoPore, 7.5 × 300 mm (p/n PL1113-6520)
Eluent	THF
Flow rate	1.0 mL/min
Inj vol	100 µL
Detector	RI
System	Agilent PL-GPC 50

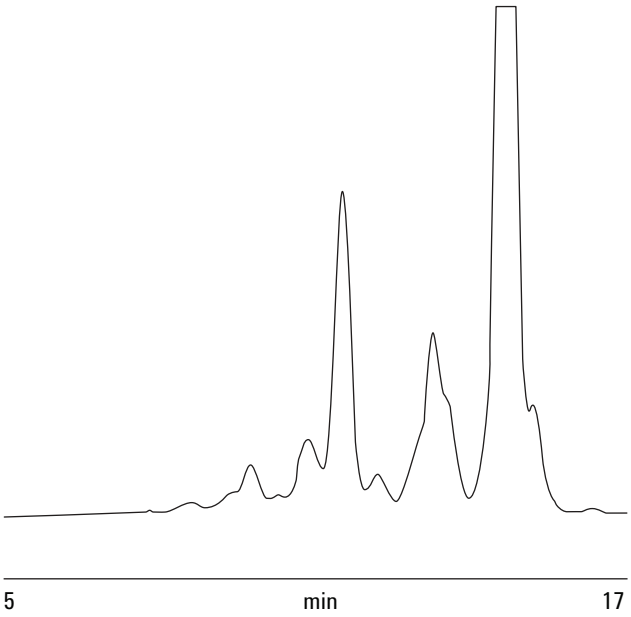

Figure 1. Epikote 828 analyzed on an Agilent OligoPore two-column set to reveal the dominance of a single oligomer.

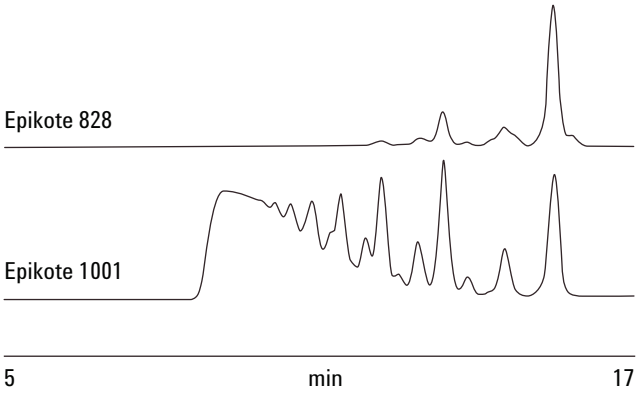

Figure 2. Comparison of Epikote 828 and 1001 epoxy resins on Agilent OligoPore columns shows that some of the oligomers are identical.

Conclusions

Low pore size Agilent OligoPore columns allow the oligomeric fingerprint of samples such as epoxy resins to be investigated quickly and accurately.

For More Information

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